

# Evidence of a natural origin for banned drug that plumps up livestock

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There may be a natural solution to the mystery of how small amounts of a banned drug that disrupts thyroid function and plumps up livestock gets into their bodies — and the bodies of humans, scientists are reporting. Their study, which appears in *ACS' Journal of Agricultural and Food Chemistry*, reports the first evidence that the substance can form naturally in feed and food.

Julie Vanden Bussche and colleagues explain that thiouracil is a drug that increases the weight of [livestock](#) by making them retain water. Some regulatory agencies have banned its use because the extra weight cheats consumers, who buy water for the price of meat, and because of potential adverse health effects. To keep an eye on compliance, government agencies test animals for thiouracil. For example, both the U.S. Department of Agriculture and the European Union Reference Laboratories developed sensitive tests to detect thiouracil. Perhaps because these tests are so sensitive, the drug is now showing up often but at low levels — levels that are lower than expected if the animals were purposely doped. Hence, some scientists speculated that thiouracil may also have a natural origin. To settle the controversy, the researchers analyzed livestock feed and other food for the presence of thiouracil.

They found that plants in the family called Brassicaceae — which includes cruciferous vegetables, such as broccoli and cauliflower, and other plants, such as rapeseed and feeding cabbage, that are used as animal feed — had small amounts of thiouracil in them naturally. "To the best of our knowledge this study is the first to report the presence of

naturally occurring thiouracil in [feed](#) and [food](#) samples, hereby elucidating and acknowledging a natural origin for the low-level residues detected in urine of various species," say the researchers.

**More information:** "Feed or Food Responsible for the Presence of Low-Level Thiouracil in Urine of Livestock and Humans?" J. Agric. Food Chem., 2011, 59 (10), pp 5786–5792 [DOI: 10.1021/jf200556x](https://doi.org/10.1021/jf200556x)

### **Abstract**

In recent years, questions have been raised on the possible semi-endogenous status of the alleged xenobiotic thyreostatic drug thiouracil; thiouracil has been detected in the urine of various animals (livestock and domesticated) at concentrations between 1 and 10  $\mu\text{g L}^{-1}$  and also in human urine. Although several studies suggest Brassicaceae-derived feed as potential origin, no traces of thiouracil have been detected in feed so far. Therefore, the aim of this study was to elucidate the origin of thiouracil in the urine of livestock and humans. To this purpose various Brassicaceae feed and food sources (e.g., rapeseed, rapeseed coarse meal, cabbage, cauliflower, broccoli) were investigated for the presence of thiouracil. In addition, the impact of the Brassicaceae-related  $\beta$ -thioglucosidase enzyme was evaluated. This myrosinase enzyme appeared to be crucial, because without its catalyzed hydrolysis no thiouracil could be detected in the various Brassicaceae-derived samples. Therefore, a sample pretreatment with incorporated enzymatic hydrolysis was developed after ensuring the quality performance of the extracted myrosinase mixture with a single-point glucose assay. Upon enzymatic hydrolysis and LC-MS2 analysis, thiouracil was successfully detected in samples of traditional rapeseed, rapeseed-‘00’ variety coarse meal (values of erucic acid

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